

## Quarterly Progress Report #14

For the project entitled:

### Field Evaluation of the Performance of Three Concrete Bridge Decks on Montana Route 243

*Reporting Period: April 1, 2005 – June 30, 2005*  
*(Quarter 4, State Fiscal Year 2005)*

#### Summary of Expenditures

The table below summarizes the expenditures on this project through June 30, 2005. Expenditures during this quarter were \$3,247.02, with total expenditures through June 30, 2005 equaling \$290,332.52.

Budget Category	Spent through 3/31/05	Spent This Quarter	Total Spent
Salaries	\$125,684.55	\$2,160.55	\$127,845.10
Benefits	\$22,407.69	\$532.14	\$22,939.83
In-State Travel	\$16,433.28		\$16,433.28
Expendable Supplies	\$17,644.24	\$13.16	\$17,657.40
Tuition	\$13,348.50		\$13,348.50
Reporting	\$0.00		\$0.00
MDT Direct Costs	\$195,518.26	\$2,705.85	\$198,224.11
Overhead	\$34,679.54	\$541.17	\$35,220.71
MDT Share	\$230,197.80	\$3,247.02	\$233,444.82
CE Share	\$8,887.70	\$0.00	\$8,887.70
WTI Share (Equipment and Out- of-State Travel)	\$48,000.00	\$0.00	\$48,000.00
<b>Total</b>	<b>\$287,085.50</b>	<b>\$3,247.02</b>	<b>\$290,332.52</b>

**Task A: Project Management**

Work in this area generally focused on regularly downloading long-term strain data from the bridges and maintaining the data acquisition equipment and associated software. Additionally, preparations were made for the upcoming live load tests.

**Task B: Conduct Literature Review**

The primary literature review for this project has been completed. Nonetheless, the time frame for this project is quite long, so information will continue to be collected throughout its duration. Relevant literature collected throughout the first 2½ years of the project is summarized in the interim report (July 2004). New information collected since then will be summarized in the final report for the project.

Action Items for next quarter:

- Continue collecting and synthesizing relevant literature

**Task C: Develop Instrumentation Plan and Assemble Data Acquisition System****Determine Gage Locations**

All proposed work has been accomplished for this task, and no additional work is anticipated. Past accomplishments for this task are summarized in the interim project report.

**Weather Station**

The remote weather station continues to function well, collecting pertinent weather information every 15 minutes and automatically downloading it to a central, searchable database.

The main office at the Saco Public Schools is currently being remodeled and they would like to move the data acquisition system associated with the weather station into the main server room (approximately 12 feet away). Access to the Internet has been down during this time, but is scheduled to be restored in early July. Relocating the data acquisition box is problematic since the cables from the sensors atop the roof are not long enough to reach the new location. Eli Cuelho will coordinate with Ron McCoy, the computer technician for Saco Schools, to rectify the problem during the upcoming quarter.

Action Items for next quarter:

- Make plans to potentially relocate the weather station data acquisition equipment

**Bridge Monitoring Data Acquisition System**

The long term monitoring equipment functioned properly during this quarter. More recently, however, the Saco public school has been remodeling the main office where the

weather station data acquisition system and data transfer hub are located, making it difficult to communicate with the bridge decks using the remote Internet connection.

Action Items for Next Quarter:

- Continue to preserve and maintain the accuracy of long-term monitoring system

**Task D: Install Instrumentation and Compile As-Built Documentation**

**Instrumentation Installation**

All proposed work has been accomplished for this task, and no additional work is anticipated. Past accomplishments for this task are summarized in the interim project report (July 2004).

**Materials Testing**

The properties of all the materials used to construct the three Saco bridge decks were summarized and included in the interim report. These material properties for the concrete recorded in the interim report reflect their strength approximately one month after the bridge decks in Saco were cast. Additional concrete test specimens (compression cylinders and rupture beams) have been stored at the bridge site for the past two years and will be tested next quarter to determine the strength parameters of the deck concrete coincident with the second live load tests.

Action Items for Next Quarter

- Continue periodic measurement of shrinkage specimens
- Transport concrete test specimens to MSU to conduct strength tests

**Task E: Live Load Testing**

Preliminary planning for the final live load tests scheduled for July 2005 has begun. Next quarter, WTI will contact MDT in Malta to schedule the test trucks and the traffic control. WTI personnel are also preparing to travel to the Saco bridge site to prepare in advance for the live load tests. Live load tests are tentatively scheduled for the third week in July (July 18-22).

Action Items for Next Quarter

- Schedule test trucks and traffic control for live load tests
- Travel to Saco bridge site and prepare for the live load tests
- Conduct live load testing

**Task F: Long-Term Monitoring****Strain Monitoring**

Approximately 25 months of long-term data has been collected from selected sensors in each of the bridge decks. All the active long term sensors continue to provide measurements once every hour. The long-term strain data is currently being analyzed to determine temperature related effects on the performance of each of the bridge decks.

**Action Items for Next Quarter:**

- Continue long-term monitoring of strain and temperature in the bridge decks

**Large Vehicle Event Monitoring**

The data loggers continued to monitor large vehicle events throughout this quarter, and the raw data are being analyzed. Comparisons of events captured by the roadside classifier and those captured by the bridges' data acquisition systems are currently underway. Early comparisons indicate that the permanent roadside vehicle classifier near the bridges is malfunctioning, and this problem will be investigated and rectified next quarter.

**Action Items for Next Quarter:**

- Continue collecting large vehicle event data
- Make comparisons between data collected from the bridges to data collected by the classifier
- Investigate and repair problems with roadside vehicle classifier near bridges

**Corrosion Testing**

The next set of carbonation and half-cell tests will be conducted when WTI researchers visit the Saco bridges in July 2005 during the second live load tests.

**Crack Mapping**

No new cracks in the bridge decks were detected during the crack survey conducted during this quarter by Craig Abernathy of MDT. WTI will conduct a crack survey when at the bridges for the live load tests in July.

**Action Items for Next Quarter:**

- WTI will conduct crack survey

**Task G: Analysis**

The data available from the long term monitoring effort continues to be studied to correlate changes in deck performance with the vehicle and environmental loads they have experienced.

The relative performance of the three deck types will be further evaluated by comparing their responses under the seasonal and daily temperature fluctuations they experience. This analysis will be summarized in the final report for the project.

Action Items for Next Quarter:

- Continue to organize and analyze long-term strain data

**Task H: Project Reporting**

A paper summarizing the accomplishments and preliminary results of the Saco Bridge project is being written for submission to the Transportation Research Board's annual meeting in Washington D.C., January 2006.

Action Items for Next Quarter:

- Quarterly progress report for first quarter of state fiscal year 2006
- Submit paper to Transportation Research Board